REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-8 remain pending in the present Application. Claims 1, 2 and 6-8 are amended support for which is found at least at Figures 3 and 12 of the specification. No new matter has been added.

By way of summary, the Official Action presents the following issue: Claims 1-8 stand rejected under 35 U.S.C. § 101; and Claims 1-8 stand rejected under 35 U.S.C. § 103 as being unpatentable over Coulson et al. ("A Statistical Basis for Longnormal Shadowing Effects in Multipath Fading Channels", hereinafter "Coulson") in view of Zhao ("Multipath Propagation Characterization for Terrestrial Mobile and Fixed Microwave Communications," hereinafter "Zhao").

REJECTION UNDER 35 U.S.C. § 101

The Official Action has rejected Claims 1-8 under 35 U.S.C. § 101 as allegedly reciting non-statutory subject matter.

In the Official Action, it was noted that since the generated propagation paths were not stored, that the claims did not recite statutory subject matter. Although the Applicants note that the result of the claimed advancements, namely, the output of time-varying propagation paths is clearly a tangible result, Applicants provide the memory storage noted in the Official Action. Specifically, Applicants have amended Claims 1, 2, and 6 to provide for a buffer memory and have amended Claims 7 and 8 to clarify that an output is generated (i.e., result).

Accordingly, Applicants respectfully request that the rejection of Claims 1-8 under 35 U.S.C. § 101 be withdrawn.

REJECTION UNDER 35 U.S.C. § 103

The outstanding Official Action has rejected Claims 1-8 under 35 U.S.C. § 103 as being unpatentable over Coulson and Zhao. The Official Action states that Coulson discloses all of the Applicants' claim features with the exception of generating time-varying propagation paths, if a shadowing object is present in the line of sight, a received electric field strength E is given as the summation of E1 and E2 that are electric field strengths of radio propagation paths diffracted by knife-edges. However, the Official Action cites Zhao as describing this more detailed aspect of the Applicants' claimed advancements, and states that it would have been obvious, to one of ordinary skill in the art at the time the advancements were made, to combine the cited references for arriving at the Applicants' claims. Applicants respectfully traverse the rejection.

Claim 1 recites, *inter alia*, a time-varying multi-path generating apparatus for simulating multi-path fluctuations in radio communications, having:

> ... time-varying amplitude functions are aligned serially in the time domain such that a time-varying shadow amplitude function is obtained, which is repeated N times, where N represents the number of the propagation paths, resulting in N time-varying shadow amplitude functions,
>
> the time-varying phase functions are aligned serially in the time domain such that a time-varying shadow phase function is obtained, which is repeated N times, where N represents the number of the propagation paths, resulting in N time-varying shadow phase functions,
>
> an initial amplitude, an initial phase, an initial time delay, and an initial arrival direction are generated as the propagation path parameters of a propagation path using random numbers provided by the random number generating unit based on the initial value generation parameters stored in the data storage unit, and
>
> the time-varying shadow amplitude functions and the time-varying shadow phase functions are superimposed on the initial amplitude and the initial phase, respectively, for generating a plurality of time-varying propagation paths,
>
> wherein, when generating the time varying propagation paths, if a shadowing object is present in the line of sight, a received electric field strength E is given as the summation of E1 and E2 that are electric field strengths of radio propagation paths diffracted by knife-edges at opposite ends of the shadowing object. (emphasis added)

Coulson describes an empirical explanation of the lognormal and Rayleigh distribution for describing multi path fading. At section II a description of wide-bend fading channels is provided in terms of a mathematical model. At section III the central limit theorem (CLT) is applied to both the lognormal and Rayleigh models. As noted in Table 2, Rayleigh Lognormal and Suzuki distributions were compared to a range of variants.[1] As noted in the Conclusion, observations with respect to each of the Lognormal Suzuki and Rayleigh distributions were identified for determining which model characteristics were best applied to a given channel behavior.

As noted in the Official Action at page 5, Coulson does not disclose or suggest generating time-varying propagation paths, if a shadowing object is present in the line of sight, a received electrical field strength E is given as the summation of E1 and E2 that are electric field strengths of propagation paths diffracted by knife-edges. However, the Official Action has cited a secondary reference, namely, the Zhao reference as describing this feature.

Zhao describes knife-edge diffraction in Figure 13.

Conversely, in an exemplary embodiment of the Applicant's claim advancements, a time-varying multi-path generating apparatus is provided for simulating multi-path fluctuations in radio communications. The apparatus includes a plurality of time-varying amplitude functions and a plurality of time-varying phase functions generated based on parameters and data files for propagation path generation, the generated time-varying propagation paths being stored in a buffer. The parameters and the data files are stored in the data storage unit and random numbers are generated by random number generating unit. The time-varying amplitude functions are aligned serially in the time domain such that a time-varying shadow amplitude function is obtained. This process is repeated N times, where N represents the number of the propagation path, resulting in N time-varying shadow amplitude

[1] See Coulson at page 497-500.

functions. The time-varying phase functions are aligned serially in the time domain such that the time-varying shadow phase function is obtained. This process is repeated N times where N represents the number of the propagation paths, resulting in N time-varying shadow phase functions. An initial amplitude, an initial phase, an initial time delay, and an initial arrival direction are generated as the propagation path parameters of a propagation path using the random number provided by the random number generating unit based on an initial value generation parameter stored in the data storage unit. The time-varying shadow amplitude functions and the time-varying phase functions are superimposed on an initial amplitude and initial phase, respectively, generating a plurality of time-varying propagation paths. When generating the time varying propagation paths, if a shadowing object is present in the line of sight, a received electric field strength E is given as the summation of E1 and E2 that are electric field strengths of radio propagation paths diffracted by knife-edges at opposite ends of the shadowing object.

Zhao merely describes, as shown in Figure 13, page 13 of the reference, that knife-edge diffraction is determined at one end of each of shadowing objects. Zhao does not disclose or suggest the knife-edge diffraction at opposite ends of a shadowing object as currently recited in amended Claim 1, or any claims depending therefrom. Likewise, as independent Claims 2 and 6-8 recite substantially similar limitations to that discussed above, Applicants respectfully submit that these claims are likewise allowable.

Accordingly, Applicants respectfully request the rejection of Claims 1-8 under 35 U.S.C. § 103 be withdrawn.

CONCLUSION

Consequently, in view of the foregoing amendment and remarks, it is respectfully submitted that the present application, including Claims 1-8, is patentably distinguishing over the prior art, in condition for allowance, and such action is respectfully requested at an early date.

Respectfully submitted,

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